

Appendix 3. Modes of Samples in the San Francisco Mountain Volcanic System, and Selected Basalts from the Eastern San Francisco Volcanic Field. Minerals in Volume Percent.

	1	2	3	4	5	6	7
Sample	3823A	2A06	2812A	2031A	2031.B	3732J	DC04B
Map Name	basalt	basalt	basalt	basalt	basalt	andesite	andesite
TAS Name	basalt	basalt	basalt	basalt	basalt	mugearite	mugearite
Field	flow	flow	flow	flow	flow	flow	flow
SiO ₂	48.7	48.9	49.7	50.4	51.0	52.2	53.0
Plagioclase	14.6, An69	8.3, An70	25.6, An67	25.5, An71	20.2, An74	29, An64	32.0, An62
Olivine	11.2, Fo83	10.9, Fo84	8.1, Fo73	7.0, Fo77	3.9, Fo76	3, Fo75	6.6, Fo75
Clinopyroxene	4.3	4.3	4.6	1.8	1.3	0	trace
Opaque Oxide	4.1	0.2	0.5	1.6	0.3	1	2.4
Matrix	65.8	76.3	61.2	64.1	74.4	67	59.0
Points	1165	1173	1504	1464	1347	827	1549
Matrix Texture	intergranular	inter-sertal	intergranular	intergranular	inter-sertal	microcrystalline	inter-sertal
MF1959 Symbol						Qa1	Qa1
I-1663 Symbol						Qao	Qao

	8	9	10	11	12	13	14
Sample	3732K	3732Z	3732Y	2705D	3831A	3729Q	3707
Map Name	andesite	andesite	andesite	andesite	andesite	andesite	andesite
TAS Name	mugearite	mugearite	mugearite	mugearite	mugearite	mugearite	mugearite
Field	flow	flow	dike	flow	flow	flow	flow
SiO ₂	53.4	53.7	53.8	55.2	55.3	56.0	56.6
Plagioclase	24.8, An64	15.3, An61	30.2, An61	42.1, An52	27.0, An62	29.8, An57	41.2, An57
Olivine	2.8, Fo69	3.1, Fo65	4.1	5.6	4.3, Fo62	3.7 Fo57	2.5, Fo58
Clinopyroxene	0.2	0.5	1.5	2.1	0.8	3.0	1.1
Orthopyroxene	-	-	0.5	-	-	0.2	-
Opaque Oxide	0.3	0.8	3.0	1.0	0.6	2.1	1.4
Matrix	71.8	80.3	60.7	49.2	67.2	61.1	53.8
Points	1196	1785	854	1844	1428	1029	1540
Matrix Texture	hyalo-pilitic	inter-granular	inter-sertal	hyalo-ophitic	hyalo-pilitic	hyalo-ophitic	micro-crystalline
MF1959 Symbol	Qa1	Qa1	Qai	Qa1	Qa2	Qa2	Qa2
I-1663 Symbol	Qao	Qao	Qai	Qao	Qay	Qay	Qay

Notes:

1. Samples 1-5 are basalts from the eastern San Francisco volcanic field. Sample numbers, locations, and chemical analyses are on MF-1960 (Moore and Wolfe, 1987). Mineral compositions are by microprobe analysis from Moore (1974).
2. Samples 6-60 are porphyritic-aphanitic samples from the San Francisco Mountain volcanic system. Sample numbers, locations, and chemical analyses are on MF-1959 (Wolfe, et al., 1987a). Mineral compositions are estimated by petrographic microscope methods; see text for discussion. Samples are listed in order of increasing SiO₂.
3. Samples 61-63 are porphyritic-phaneritic samples from San Francisco Mountain. Sample numbers, locations, and chemical analyses are on MF-1959 (Wolfe, et al., 1987a). Samples are listed in order of increasing SiO₂.
4. Sample 64 is of micrographic quartz and alkali feldspar residuum in sample 63 (3733C).
5. Samples 20, 23, 27, 30, 31 are andesites that are more mafic than most andesites, with higher An, Fo, and En for equivalent silica contents.
6. Samples 65-71 are miscellaneous samples that lack chemical analyses. Silica content is estimated from mineral compositions using the data curves in Figure 10.

	15	16	17	18	19	20
Sample	DC65	3732+	3732%	2704B	3729A	3733E
Map Name	andesite	andesite	andesite	andesite	andesite	andesite
TAS Name	benmoreite	andesite	benmoreite	benmoreite	benmoreite	andesite
Field	flow	flow	flow	flow	flow	flow
SiO2	57.3	57.4	58.1	58.6	58.9	59.1
Plagioclase	38.5, An58	42.4, An58	25.4, An32	38.8, An49	38.3, An47	16.6, An64
Olivine	1.7 Fo63	1.5, Fo61	0.1	0.3	1.1, Fo57	0.1
Clinopyroxene	0.9	1.9	2.3	3.0	2.4	2.1
Orthopyroxene	-	3.2, En61	1.3	1.2, En60	3.5, En57	3.4, En72
Opaque Oxide	1.9	1.1	2.4	1.5	1.8	0.4
Matrix	56.9	49.9	68.5	55.1	52.9	77.4
Points	1103	1529	1685	1295	1256	1220
Matrix Texture	inter-granular	hyalo-ophitic	inter-sertal	hyalo-pilitic	hyalo-crystal.	inter-sertal
MF1959 Symbol	Qa2	Qa1	Qa2	Qa2	Qa2	Qa1
I-1663 Symbol	Qay	Qao	Qay	Qay	Qay	Qao

	21	22	23	24	25	26
Sample	3732H	3728A	3728C	3728	2705E	3729I
Map Name	andesite	andesite	andesite	andesite	andesite	andesite
TAS Name	benmoreite	benmoreite	benmoreite	benmoreite	benmoreite	benmoreite
Field	flow	flow	flow	flow	flow	flow
SiO2	59.5	59.5	59.6	60.2	60.4	60.4
Plagioclase	25.8, An57	20.5, An56	27.2, An65	18.7, An37	27.8, An49	15.9, An57
Olivine	-	0.5	-	0.5	0.3, Fo51	-
Clinopyroxene	2.2	0.8	3.2	0.5	0.1	0.5
Orthopyroxene	3.6, En69	2.4, En63	4.0	1.7	0.4	3.0, En60
Hornblende	-	-	-	0.5	-	1.6
Apatite	-	-	-	-	0.2	-
Opaque Oxide	2.4	1.4	1.0	2.4	0.6	2.3
Matrix	66.0	74.4	64.6	75.7	70.6	76.7
Points	1195	1374	907	1691	2874	1581
Matrix Texture	hyalo-pilitic	hyalo-crystalline	hyalo-ophitic	micro-crystalline	micro-crystal.	hyalo-pilitic
MF1959 Symbol	Qa1	Qa1	Qa1	Qa1	Qa1	Qa1
I-1663 Symbol	Qao	Qao	Qao	Qao	Qao	Qao

	27	28	29	30	31	32
Sample	DC30	2602	DC09	DC42	DC03C	DC23
Map Name	andesite	andesite	andesite	andesite	andesite	andesite
TAS Name	benmoreite	latite	benmoreite	benmoreite	andesite	benmoreite
Field	flow	flow	flow	flow	pyroclast	flow
SiO2	60.6	60.6	60.8	60.9	60.9	61.1
Plagioclase	13.7, An62	29.1, An47	16.4, An46	28.9, An60	17.8, An63	23.3, An23
Olivine	0.7	-	0.3	1.1, Fo65	0.2	1.5
Clinopyroxene	0.7	-	0.3	0.5	0.9	1.7
Orthopyroxene	1.7, En67	2.4	3.0, En54	1.7, En64	3.6, En67	2.5
Hornblende	1.0	2.8	1.8	-	-	0.5
Opaque Oxide	1.1	2.5	2.2	1.1	0.6	1.7
Matrix	81.2	63.3	76.0	66.7	76.9	70.1
Points	724	1279	1441	1325	1349	1720
Matrix Texture	hyalo-pilitic	inter-sertal	hyalo-ophitic	hyalo-ophitic	hyalo-pilitic	hyalo-ophitic
MF1959 Symbol	Qa1	Qaa2	Qa1	Qa1	Qa1	Qa1
I-1663 Symbol	Qao	Qaay	Qao	Qao	Qao	Qao

	33	34	35	36	37	38
Sample	DC11	3711	2727	DC13B	3819	3614A
Map Name	andesite	dacite	dacite	andesite	dacite	dacite
TAS Name	benmoreite	benmoreite	trachyte	benmoreite	trachyte	trachyte
Field	flow	flow	dome	flow	flow	flow
SiO2	61.6	62.1	62.2	62.3	62.6	63.1
Plagioclase	13.4, An50	20.6, An47	27.9, An43	19.0, An48	4.2, An37	25.1, An27
Olivine	0.4	-	1.5	-	0.1	-
Clinopyroxene	0.8	-	0.2	0.6	-	-
Orthopyroxene	3.0	3.9, En46	3.2	3.5	0.1	0.7
Hornblende	2.1	5.0	3.2	0.9	0.1	5.3
Biotite	-	0.3	-	-	0.7	2.1
Quartz	-	-	-	-	0.3	-
Cristob/Trid	-	-	-	-	-	1.6
Opaque Oxide	1.7	3.3	3.9	2.4	0.4	1.7
Matrix	78.6	67.0	60.2	73.6	94.1	63.5
Points	1555	1590	1350	1346	1355	773
Matrix Texture	hyalo-ophitic	inter-sertal	hypo-crystalline	inter-sertal	hyalo-pilitic	hyalo-ophitic
MF1959 Symbol	Qal	Qrd1	Qdd	Qal	Qdd2	Qhdf
I-1663 Symbol	Qao	Qdro	Qddh	Qao	Qddm	Qdhy
	39	40	41	42	43	44
Sample	3727A	3712	3727	3733A	3720	2725
Map Name	dacite	dacite	dacite	dacite	dacite	dacite
TAS Name	trachyte	trachyte	trachyte	trachyte	trachyte	trachyte
Field	dome & flow	flow	flow	dike	dome	flow
SiO2	63.2	63.6	63.8	63.9	64.5	65.4
Plagioclase	23.2, An41	17.6, An42	25.6, An43	30.7, An29	28.6, An38	26.9, An29
Olivine	-	-	-	-	-	0.2, Fo24
Clinopyroxene	0.3	-	1.7	0.1	-	-
Orthopyroxene	2.8, En42	0.6	4.8, En42	3.4	0.9, En40	4.3, En38
Hornblende	3.6	0.9	-	2.9	6.2	3.1
Biotite	0.4	-	-	-	2.6	1.5
Quartz	-	0.5	-	1.0	-	-
Cristob/Trid	-	-	-	-	1.0	0.4
Opaque Oxide	1.7	0.7	2.6	1.8	2.7	2.6
Matrix	68.0	79.7	65.3	60.1	58.0	61.0
Points	1231	1485	1000	1482	1621	1910
Matrix Texture	inter-sertal	hyalo-pilitic	inter-sertal	micro-granitic	hyalo-pilitic	hypo-crystalline
MF1959 Symbol	Qrd2	Qlmd	Qsfd	Qdi	Qhd	Qed3
I-1663 Symbol	Qdry	Qdlm	Qd	Qdi	Qhdo	Qdey
	45	46	47	48	49	50
Sample	2830	3831	3819A	2725A	2704	2704C
Map Name	dacite	dacite	dacite	dacite	dacite	dacite
TAS Name	trachyte	trachyte	trachyte	trachyte	trachyte	trachyte
Field	dome	flow	pyroclast	dike	flow	dome
SiO2	65.4	65.8	66.1	66.5	66.5	66.9
Plagioclase	36.5, An34	6.5, An22	8.4, An24	20.4, An27	27.2, An30	23.1, An29
Olivine	0.1	0.2	0.8, Fo31	0.1	0.1	0.5, Fo18
Clinopyroxene	0.8	-	-	-	-	-
Orthopyroxene	5.4, En42	0.3	0.9, En30	3.8, En34	3.1, En42	3.3, En34
Hornblende	0.3	-	1.4	2.1	2.7	4.1
Biotite	-	1.6	0.7	1.1	2.8	2.3
Quartz	-	0.2	-	-	-	-
Opaque Oxide	2.1	0.3	0.2	1.0	0.7	2.0
Matrix	54.8	91.1	87.7	71.4	63.3	64.6
Points	1219	1550	1022	1546	1552	1582
Matrix Texture	inter-sertal	micro-crystalline	pumiceous	micro-crystalline	micro-crystal.	micro-crystalline
MF1959 Symbol	Qed2	Qdd3	Qsfp	Qedi	Qdfd	Qfd
I-1663 Symbol	Qdem	Qddy	Qpf	Qdti	Qdff	Qdf

	51	52	53	54	55	56
Sample	3713A	3616A	3732N	3733	3612	3723
Map Name	dacite	rhyolite	rhyolite	rhyolite	rhyolite	rhyolite
TAS Name	trachyte	rhyolite	peralkaline rhyolite	peralkaline rhyolite	rhyolite	rhyolite
Field	dome	dome	dike	dome	dome	pyroclast
SiO2	68.6	72.9	74.4	74.5	74.6	74.7
Plagioclase	-	1.4, An3	-	-	3.4, An16	4.0, An3
anorthoclase	17.4	5.1	-	-	22.2	3.0
Sanidine	-	0.9	2.5	9.5	1.2	8.9
Quartz	-	2.3	4.7	11.9	1.4	4.7
Olivine	-	-	-	-	-	0.3
Hornblende	-	0.1	-	-	0.3	-
Biotite	2.4	1.4	-	-	2.5	1.2
Riebeckite	-	-	-	2.1	-	-
Aegirine-	-	-	6.9	0.9	-	-
Augite	-	-	-	-	-	-
Aenigmatite	-	-	1.2	3.1	-	-
Opaque Oxide	0.6	0.4	0.4	-	0.1	-
Matrix	79.5	88.3	84.0	72.4	69.0	77.9
Points	1154	2096	2134	2137	1627	1367
Matrix	felsitic	felsitic	felsitic	micro- granitic	micro- crystal.	pumiceous
Texture						
MF1959 Symbol	Tnsd	Qhr	Qri	Qdsr	Qwhr	Qsgp
I-1663 Symbol	Tdns		Qri	Qrf		Qts

	57	58	59	60
Sample	2705B	3819B	3723B	3734A
Map Name	rhyolite	rhyolite	rhyolite	rhyolite
TAS Name	peralkaline rhyolite	rhyolite	rhyolite	rhyolite
Field	flow	pyroclast	dome	dome
SiO2	74.7	75.1	75.7	76.1
Plagioclase	-	2.2, An16	3.6, An4	5.4, An16
anorthoclase	-	13.1	12.2	8.2
Sanidine	2.0	-	8.0	4.3
Quartz	17.7	11.2	4.6	12.2
Olivine	-	-	0.4, Fo0	-
Biotite	-	-	1.6	2.7
Aegirine-	3.7	-	-	-
Augite	-	-	-	-
Opaque Oxide	0.7	0.5	0.2	2.7
Matrix	75.9	73.0	69.4	66.1
Points	1567	1112	1626	1716
Matrix	felsitic	felsitic	hypo- crystalline	felsitic
Texture				
MF1959 Symbol	Qdr	QsfP	Qsgr	Qrr1
I-1663 Symbol	Qro	Qpf	Qrs	Qrro

	61	62	63	64	65
Sample	3732R	3729K	3733C	3733C	7/29/71/8
MF1959 Name	diorite	andesite	quartz monzodiorite		diorite
I-1663 Name	microdiorite	andesite	Quartz monzodiorite dike	granophyric residuum inter- stitial	pyroxene leucodiorite plug
Field	plug	dike			
SiO2	55.4	57.0	57.8		~61
Plagioclase	63.9, An59	43.3, An55	63.7, An55	-	74.7, An53
alkali	5.5	-	9.7	57	1.6
feldspar					
Quartz	1.3	-	4.6	43	1.5
Olivine	0.3	2.8	1.2	-	3.6
Clinopyroxene	13.7	2.5	7.1	-	8.4
Pigeonite	-	-	4.9	-	1.8
Orthopyroxene	6.4, En70	3.5, En60	4.0, En60	-	4.6, En54
Inverted pigeonite					
Apatite	-	-	1.2	-	0.6
Opaque Oxide	8.9	3.4	3.7	-	3.0
Matrix	-	44.5	-	-	-
Points	1597	1165	1606	1582	1699
Texture	fine hypidio- morphic	fine hypidi- omorphie	medium hypidio- morphic	micro- graphic	medium hypidio- morphic
Q	1.8		5.9		1.9
A	7.8		12.4		2.1
P	90.4		81.7		96.0
An%	35		31		
M'	29.3		20.9		21.4
MF1959 Symbol	Qdii	Qai	Qmi		Qdii
I-1663 Symbol	Qmdi	Qai	Qmi		Qpli

	66	67
Sample	6/29/77/2B	10/4/77/3
MF1959 Name	crumble breccia	older dacite
I-1663 Name	older dacite of Elden Mt.	older dacite of Doyle Pk
Field	dome	flow
SiO2	not determined	~67
Plagioclase	26.2, An37	20.7, An35
olivine	0.3	-
orthopyroxene	3.3	-
hornblende	2.5	0.7
biotite	0.5	7.5
Opaque Oxide	1.5	1.3
Matrix	65.6	69.8
Points	1534	1500
Matrix texture	hypidio- morphic	hyalopilitic
MF1959 Symbol	Qed1	Qdd1
I-1663 Symbol	Qdeo	Qddo

	68	69	70	71
Sample	8/5/75/7	7/7/72/2	7/11/72/2	7/11/72/3
MF-1959 Name	rhyolite	rhyolite	rhyolite	rhyolite
I-1663 Name	rhyolite, rhyolite obsidian	rhyolite, rhyolite obsidian	rhyolite, rhyolite obsidian	rhyolite, rhyolite obsidian
Field	flow	flow	flow	flow
SiO2	n.d.	n.d.	n.d.	n.d.
anorthoclase	8.7	1.2	-	-
Sanidine	3.5	8.4	8.6	7.5
Quartz		9.4	7.8	16.7
Olivine	0.4, Fol	-	0.4	-
ferroheden- bergite?	0.7	-	-	-
Riebeckite	-	-	7.9	3.7
Aegirine- Augite	-	3.0	0.1	-
Aenigmatite	-	-	-	1.1
Opaque Oxide	0.1	0.8	0.6	0.6
Matrix	86.6	77.3	74.5	70.4
Points	1616	1465	1649	1391
Matrix Texture	crypto- crystalline	micro- crystalline	micro- crystalline	micro- crystalline
MF1959 Symbol	Qdr	Qdr	Qdr	Qdr
I-1663 Symbol	Qro	Qro	Qro	Qro